

### IMPULSE DRYING OF PAPER

#### BENEFITS

- Decreased energy use for drying operations
- Reduced emissions of CO<sub>2</sub>, VOCs, and particulates during papermaking
- Increased production rates in dryer-limited machines
- Improved paper strength
- Reduced requirements for virgin fiber (of 25 percent)
- Increased recycled fiber content allowed for any given paper strength
- Enhanced competitiveness of final products

#### APPLICATIONS

Impulse drying can be applied to dryer-limited machines throughout the papermaking industry. Linerboard and corrugating medium-grade papers are the primary markets for the technology. The improved strength of paper produced with impulse drying allows manufacturers to reduce the weight of the product (and therefore of the virgin feedstock).



#### Impulse Drying Reduces the Need for More Energy-Intensive Drying During Papermaking

Drying is the most energy-intensive operation in the papermaking process. For more than a decade, the Department of Energy (DOE) supported the research and development efforts of the Institute of Paper Science and Technology (IPST) to develop a new technology called “impulse drying” that reduces the energy requirements for drying paper.

Impulse drying works by lowering the moisture content of the paper web entering the drying section by up to 38 percent. In a conventional papermaking operation, the web has a moisture content of 50 to 60 percent as it enters the drying phase. Obviously, this lower moisture content significantly reduces the energy required in subsequent paper-drying operations.

It is estimated that the operation of 65 impulse drying units in the year 2020 could save 13 trillion Btus of energy annually for the industry. These energy savings translate into an annual reduction in environmental emissions of 1.2 million tons of carbon dioxide, 0.24 million pounds of volatile organic compounds, and 13 million pounds of particulates.

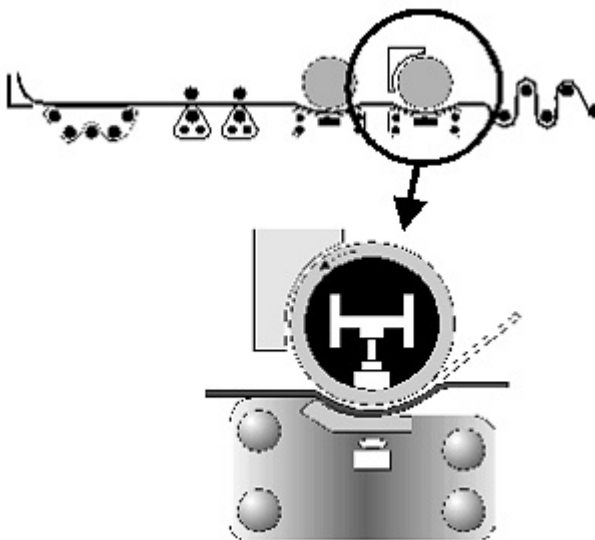


Figure 1. A new technology, “impulse drying,” can lower the moisture content of paper and paperboard entering the drying section to 38 percent, significantly reducing the energy required in subsequent paper-drying steps.

## PROJECT DESCRIPTION

**Goal:** To optimize the roll design of the impulse drying press for maximum energy efficiency and durability.

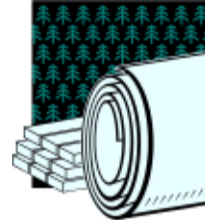
During the impulse drying process, the wet sheet is pressed in contact with a coated press roll that is heated to between 200o and 250o C. When the moist sheet contacts the hot roll, steam is generated, which helps expel water from the sheet through normal hydraulic pressure. In commercial use, the additional energy needed in the press section of the impulse drying process is more than offset by the reduced demand for steam in the drying section of the paper machine. This results in a substantial net decrease in energy use.

## PROGRESS & MILESTONES

- IPST took the impulse drying technology from concept to reality during this decade.
- Many of the results were achieved on a laboratory bench-scale, press-simulation device, using small pieces of paper (of 5-in diameter).
- The technology was pilot-tested successfully in 1997 at the facilities of the Beloit Corporation.
- Research and development were completed on special roll surfaces to control delamination problems.

## AWARDS, PATENTS, AND INVENTION RECORDS

- Support Aerated Biofilm Reactor Patent #5,116,506, May 26, 1991



### PROJECT PARTNERS

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